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Palgrave Studies in Literature, Science and Medicine

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CHAPTER 1

Introduction: The Biotech Century, Human Capital, and Genre

The twenty-first century has been widely hailed as *the biotech century* by scientists such as Ian Wilmut, E.O. Wilson, and Craig Venter; by historians such as Francis Fukuyama; by journalists in cover stories for *Time* and *The Economist*, and by investors speculating on breakthroughs in somatic cell nuclear transfer (SCNT), regenerative medicine, synthetic biology, and CRISPR-Cas9 genetic engineering. *Posthuman Capital* addresses several distinctive literary figurations of so-called posthuman embodiment—the human clone, the animal-human hybrid, the toxic body, and the digital-human—that have proliferated across a range of internationally acclaimed novels during the biotech century. By probing the potentials and limitations of biotechnology, these novels draw attention to the entanglement of bodies within particular environments, economic networks, and ecological settings. Moving beyond the fear and excitement elicited by new developments in biotechnology, these works not only recall biotechnology's roots in twentieth-century biopolitics, but they also anticipate still emergent forms of posthuman and transhuman embodiment. While the major novels my book examines (Kazuo Ishiguro's *Never Let Me Go*, Margaret Atwood's *Oryx and Crake*, Indra Sinha's *Animal's People*, and Jeanette Winterson's *The Stone Gods*) represent a range of contemporary authors with unique literary projects, these novels all locate fleshy bodies as critical meeting places for technology and social subjectivity.

Taken together, these works depict a prosthetic society where technological changes in reproduction, labour, mobility, kinship, surveillance, and ecological stability transform traditional humanist institutions.

In other words, the novels I examine all anticipate a pointedly contemporary problem: the sticky merging of flesh and technology combined with our increasing dependence on technologically based networks for the reproduction of social identities. If Michel Foucault diagnosed human individuality as a symptom of disciplinary institutions where architectural enclosures (such as prisons, hospitals, and schools) constructed fixed subject positions, then these contemporary novels figure biotech as a form of mobile discipline on-the-go that expands beyond institutional walls and across diverse, but technologically connected, urban landscapes. In the novels I examine, small mobile technologies (such as cell phones, debit cards, and Viagra pills) become “wet prosthetics” which not only travel intimately alongside bodies, but also link these bodies to dispersed technological networks capable of programming new forms of hybrid subjectivity.

While calling these emerging figures “posthuman” helps us mark an historical shift away from disciplinary humanism and its dominant definitions of modern man, I contend that “posthuman” is ultimately an imperfect and misleading term for describing many of the hybrid bodies that appear in contemporary literature. Rather, in this book, I seek to foreground the role that human capital theory has played in the formulation of neoliberal subjects as “never-human-enough.” I argue that neoliberal rationalities reimagine human belonging as an aspirational category always and structurally just out of reach. *Posthuman Capital*, therefore, highlights a series of characters who are highly motivated to “be more human,” to quote Reebok’s latest advertising campaign (2015–). In the context of neoliberalism, this directive to become “more human” is a call to appreciate one’s human capital or to upgrade one’s body through various biotechnical self-investments. Critically, however, if one can always become “more human,” then one can never, finally, become human enough or fully human.

Finally, *Posthuman Capital* not only investigates the prosthetic entanglement of various bodies and technological networks within the novels I examine; it also explores how these novels connect readers to speculative and emerging futures. Rather than emphasizing *aesthetic* reflection or *synthetic* integration, these novels offer *prosthetic* narratives that link together two irreducible and interdependent genres of futurity: the dystopian and

the post-apocalyptic. Many contemporary dystopian narratives, I argue, posit new surveillance technologies as an organizing node around which the centripetal forces of political control and social inequality develop. Alternatively, post-apocalyptic narratives often hinge on the fatal inability of institutions and networks to effectively manage the centrifugal threats posed by non-human forces, particularly viruses, toxins, and climates. Drawing on the Greek prefix “pros,” meaning “toward and in addition to,” prosthetic novels orient readers “toward” futures framed as extensions or “additions to” the recognizable present. These works show how fears of apocalyptic disorder become alibis for dystopian control, while also illustrating how this control precipitates planetary and social disasters. By not subsuming one genre to the other, these prosthetic novels reveal and interrupt the mutual dependencies which allow these two genres of futurity to function in tandem like an engine that drives cultural attitudes and expectations about the unwelcome future.

Divided into three sections, this introduction begins by exploring the scientific, political, and legal narratives that have helped frame the twenty-first century as the biotech century, particularly in the United States and the United Kingdom. Although many of these narratives have shifted in response to major developments in bioscience, the story of a biotech future has increasingly located the human figure as standing behind or emerging after biotechnological interventions. Whether it is E.O. Wilson’s vision of a “New Enlightenment” (2015), Ray Kurzweil’s view that *being human* means transcending biology (2005), or the Pentagon’s assertion that “Biology is Technology” (Jackson 2015), it is clear that western humanism—with all of its many exclusions—has gradually embraced a transhumanist perception of the future, a radically libertarian future predicated on economic competition. For this reason, the second section of the introduction investigates the historical role that human capital theory has played in developing neoliberal definitions of the human as *never-human-enough*. I argue that the directive to “be more [than] human” sits comfortably at the intersection of neoliberal and transhumanist models of the human. In the final section of this introduction, I preview how the literary works I discuss in this book engage narratives of a biotech future. While these novels recognize the biotechnological and economic accounts that reimagine human belonging in the twenty-first century, they also reveal and interrupt the linkages between apocalyptic fear and dystopian depression, genres that shape and limit our collective capacity to imagine an alternative, posthuman, or utopian future.

Inherently interdisciplinary, novels, at their best, trace the historical forces that condition their composition and allow these multiple discourses to develop according to their own interactive logic. Whereas scientific experimentation seeks to isolate single elements by controlling for other variables, literary works are much more interested in following the expansive interaction between many variables by understanding the *changing composition* of formal and historical relationships. In other words, it is not just that literary analysis offers a virtual environment for reflecting on the myriad historical forces that have brought it into being, but it can also play out these forces, redirecting them in new way.

FROM THE “BIOTECH CENTURY” TO “BIOLOGY IS TECHNOLOGY”

The phrase “biotech century” can be readily traced to Jeremy Rifkin’s 1999 bestselling cautionary book by the same name. As Rifkin points out, his book was part of an ongoing conversation, “on the eve of what many in the scientific and business community [were] calling the ‘Biotech Century’” (xv). Much of that conversation began two years earlier when a cloned Finnish Dorset named “Dolly” was suddenly thrust onto the global stage, a “trigger event” that “put the whole world into synchrony over biotechnology for the first time” (Bauer et al. 2002: 15). And while a sympathetic image of Dolly’s sheepish face regularly accompanied media coverage of her birth, the Dorset quickly became a symbol for an unwelcome biotechnological future driven by human cloning.

In response to Dolly’s birth, Bill Clinton spoke from the White House Rose Garden to propose a legislative ban on all forms of human cloning, arguing that “nothing makes ... [our] moral obligation more clear than the troubling possibility that these new animal-cloning techniques could be used to create a child.” At stake, for Clinton, was nothing less than “our most cherished belief about the miracle of human life and the God-given individuality each person possesses” (1997). Despite his affirmation of human exceptionalism, Clinton conceded that Dolly’s birth reconfirmed the underlying shared biomateriality of human and animal life or, in other words, the applicability of “animal-cloning techniques” to the creation of a human “child.” Seen as a threat to both liberal humanism’s conception of “individuality” and religious beliefs about the “miracle of human life,” somatic cell nuclear transfer (SCNT) initially provoked reactionary responses. Throughout the late 1990s and early 2000s, legislatures

around the globe hotly debated human cloning. The United Nations, for example, took up the issue between 2001 and 2005. Ultimately, however, widespread dissension about what counted as “the human” doomed most of these legal prohibitions, even as some informal agreements were reached.

At the heart of the debate was the question of whether or not therapeutic cloning of human stem cells was the same as the reproductive cloning of human beings. Most scientists and investors believed these were two very different procedures; however, the religious right, especially in the United States, whose rhetoric of “family values” dominated public discourse at the time,¹ insisted on lumping together therapeutic and reproductive cloning. Thus, in this early twenty-first-century context, stem cell research became locked in the “culture wars” along with Christian conservatives’ opposition to abortion, birth control, feminism, evolution, multiculturalism, and homosexuality. Indeed, in George W. Bush’s first primetime address to the nation, he appealed to his conservative base by announcing an executive order that stopped funding for the use of new human embryonic stem cells in public research, professing that “human life is a sacred gift from our Creator” (2001). On this front, then, the biotech century was off to a slow start.

In stark contrast, during this same period, the Human Genome Project (HGP) was greeted with celebratory images of human exploration, national triumph, and entrepreneurial success. During their joint press conference to announce the near-completion of the project, both Bill Clinton and Tony Blair evoked Francis Crick and Jim Watson’s discovery of DNA as an example of an ongoing “Anglo-American partnership” in bioscience (2000). Clinton’s opening remarks likened the HGP to Lewis and Clark’s expedition to the “American Frontier ... a map that ... forever expanded ... our continent,” thereby perpetuating the settler colonial ideology of Manifest Destiny. While repeatedly claiming the HGP would serve “the common good of all humankind,” both leaders emphasized that American and British “biotechnology companies are absolutely essential in this endeavor.” After all, they argued, the HGP was the product of “healthy competition” and “enhanced public-private cooperation” between “academia and their colleagues in the biotechnology and pharmaceutical industries.” In other words, unlike stem cell research, which

¹For further analysis of “family values” as an ideological construction, see Melinda Cooper’s *Family Values: Between Neoliberalism and Neoconservatism*.

uncomfortably challenged both Christian and liberal humanist views of man's sovereignty and superiority above other animals, the gene-centred research of the HGP easily upheld narratives of national expansion, Eurocentric humanism, and capitalist growth.

But then, in 2003, the HGP released its results, and, to the shock of many, it turned out that humans possess a relatively small genome. Totalling just about 21,000 genes, the human genome was “half the size of the rice plant,” and only two-thirds the size of a “humble water flea” (Collen 2015: 8).² This was not the encyclopaedic “book of life” scientists and investors had promised. True, the project made sequencing techniques faster and cheaper, and yes, the ability to translate sequences into risk profiles has provided some degree of preventative health benefits. Nevertheless, the overhyped idea that the HGP would uncover genetic cures for cancer or diabetes suddenly seemed “irrationally exuberant,” to borrow Alan Greenspan's characterization of the 1990s. DNA, the “master molecule,” had failed to cosign man's anthropocentric view of himself as the most evolved or “complex” animal on earth. And so, ten years after the sequencing, *The New York Times* reported that “geneticists are almost back to square one in knowing where to look for the roots of common disease” (Wade 2010, June 12). Buried deeply in this same article, though, are the stirrings of a new speculative direction for the biotech century: “The slowly emerging explanation is that humans and other animals have much the same set of protein-coding genes, but the human set is *regulated* in a much more complicated way” (emphasis added). In the following years, this “slowly emerging explanation” transformed into a giant component of postgenomic research, unleashing a new wave of biotechnological speculation.

While postgenomics simply refers to the period after the sequencing of the human genome, this new era is also characterized by a growing inter-

² By “genes,” I am referring to protein-coding DNA. This has been the traditional way of identifying functional genes within larger sequences, but this methodology is currently under some scrutiny. About 95 per cent of humans' DNA sequence has been considered “Junk DNA” or “the dark matter of the genome.” The research consortium ENCODE (Encyclopedia of DNA Elements) has recently found that at least some of this non-coding DNA is functional. According to ENCODE, some ncDNA helps regulate the transcription, timing, placement, and coordination of coding genes and proteins—pointing to a possible shift from what Evelyn Fox Keller calls the “pregenomic genome” to the “postgenomic genome.” Keller's essay “The Postgenomic Genome” in Sarah Richardson's collection *Postgenomics* is an accessible introduction to this still developing subject (2015).

est in gene regulation and the numerous interactions that occur within cellular environments.³ The postgenomic study of regenerative medicine, epigenetics, embryology, bacteriology, and stem cells all point to a conceptual shift away from DNA as a dictatorial molecule or sovereign power within an otherwise docile cell; instead, these fields envision an interactive relationship between DNA and their bacteria-rich cellular environments, which can cut, insert, deactivate, reactivate, and reprogram the DNA code directly.⁴ Still, somatic cell nuclear transfer (SCNT), the technique used to clone Dolly the sheep way back in 1996,⁵ remains by far the most stunning example of a cellular environment radically transforming gene expression. As Sara Franklin puts it, “post-genomic biology is defined by a return to the cell—the first and primary unit of the life sciences, overtaken mid-century by the gene, but back in ascendancy in part because of Dolly (and vice versa, for she was, in a sense, an offspring of the cellular turn)” (2007: 33). In other words, postgenomics is haunted by Dolly, the pregenomic symbol of the biotech century.

In response to this “cellular-turn,” Barack Obama, in 2009, lifted the limitations George W. Bush had placed on the use of embryological stem cells, but unlike his predecessors, Obama’s announcement was much shorter and quieter. In contrast to Clinton’s exuberance, Obama lowered

³ Of course not all postgenomic research has turned away from gene mapping as such. Data science concerning whole genomes has certainly flourished during this period, including population studies like the Genome Wide Association Study (GWS). Moreover, in her book *Race Decoded*, Catherine Bliss tracks the renewed importance of racial categories in whole genome research. Here, “technologies like haplotype mapping and principal components analysis ... shape how scientists define populations, compare their classifications with self-reported identities, and create new avenues for identity formation” (2012: 19). One key cultural dimension of this rapidly developing trend is the commercialization and popularity of ancestry mapping. And while Bliss addresses multiple issues concerning race in genomic research, she powerfully points out that “DNA-based identities ... fashion an activism that often neglects the core causes of racial injustice, such as institutional racism and structural inequality” (2012: 17).

⁴ For instance, the CRISPR-Cas9 technique for gene editing—hailed as a major breakthrough in genetic engineering—was developed by mimicking the gene-snipping immune systems of certain bacteria.

⁵ Somatic cell nuclear transfer is a technique whereby the nucleus of an embryological stem cell (egg cell) is replaced with the nucleus (DNA) from a different cell, even from a different body. Suppose, for example, I remove the nucleus from a random skin cell scraped off my arm and place it inside an embryological stem cell. The DNA from that skin cell can then become pluripotent or regenerated. This new cell might now become a liver cell or a blood cell. Or, as was the case with Dolly, this new stem cell could become a clone of me.

expectations, warning that the “promise of stem-cell research ... should not be overstated” (2009). But just as importantly, in contrast to Bush’s primetime address, Obama’s brief announcement was seemingly calculated to mitigate the prospect of stem cell research once again becoming ensnared in a thicket of political, ethical, and philosophical challenges.⁶ In this way, the biotech century proceeds, but now with more caution, managing within itself a central contradiction: on the one hand, only by selling visions of a biotech future can scientists and pharmaceutical companies attract the attention of much-needed investors, but, on the other hand, this attention always risks enflaming cultural and political disputes about the definition of human life, the status of patented life, the growth of medical inequality, and the overall desirability of these biotechnological futures.

As the scientific and legal underpinnings of bioscience have changed over the last couple of decades, the biotech century has also matured as a cultural signifier for naming the technological transformation of human belonging. From the outset, the idea of a biotech century signalled both the next chapter of human progress and a radical threat to traditional notions of human dignity and individuality. For example, *Time* magazine’s first issue of 1999 was dedicated to “The Future of Medicine: How Genetic Engineering Will Change Us in the Next Century.” On its cover *Time* displayed a bright green serpent twisted into the shape of a double-helix and wrapped around a tree branch. The visual reference to the ancient symbol for medicine, the Rod of Asclepius, is complicated by the snake itself, which curls off the branch to position its eye directly towards the reader. Unlike the iconographic serpents that appear in logos for the American Medical Association, the British Medical Association, and the World Health Organization, this snake has a personality and a presence of its own. It knows it is being watched and, therefore, appears both threatening and seductive. By animating the classical icon for medicine with a sinister allusion to the Christian story of Man’s seduction by a satanic snake, *Time* associates biotechnological knowledge with the genesis of Man’s mortality, forced labour, permanent exile, sexual humiliation, and

⁶Undoubtedly, the improved capacity to perform stem cell research without relying on embryological stem cells (egg cells) has helped blunt the political opposition from the religious right. Nevertheless, many ethical questions remain and pose potential sites of contestation, including the presupposed status of human individuality, the blurry boundary between human and animal life, and the relationship between a living organism and intellectual property (patents).



Fig. 1.1 Magazine covers that evoke Christian imagery to imagine the power of biotechnology, *Time* magazine (January 11, 1999) and *The Economist* (June 14, 2007)

gender assignment. If the cover wonders “how genetic engineering will change us in the next century,” then this evocation of Man’s fall suggests a perilous and widespread shift in the human condition (Fig. 1.1).

Eight years later, *The Economist* published a similar issue on what they called “Biology’s Big Bang” (2007). On its cover, *The Economist* reproduced a portion of Michelangelo’s painting “Adam’s Creation” from the Sistine Chapel, which depicts the hand of God reaching down from heaven to touch the out-stretched hand of Man. Here, the two hands are front-and-centre and a rainbow-coloured strand of DNA fills the gap between Adam and God’s fingers: a spark of life or squiggle of electricity. Like *Time*, *The Economist* deploys Christian imagery to visualize biotechnology, hinting that the crackling power of biotechnology might jump the ontological gap and bestow onto Man the godlike power to design life by hand. Significantly, whether depicting a benevolent deity or an evil snake, both newsmagazines imagine the coming century as an encounter with a transcendent technology that promises to permanently alter traditional western and Christian conceptions of the human.

One interpretation of this repetition can be gathered from *The Economist* article, “Biology’s Big Bang,” which asserts the historical analogy, “what physics was to the 20th century, biology will be to the 21st” (2007: 13). In relation to twentieth-century physics, the idea of a techno-scientific “big bang” recalls the image of a mushroom cloud and the weaponization of physics through the creation of the atom bomb. After all, “what physics [became] to the 20th century” was a nuclear arms race that, after 1989, established the United States as the sole global hegemon. In other words, one way to interpret the repeated Christian vision of Man’s fall or ascension due to biotechnology is as an anxious analogue for a hegemonic world order that is rooted in the cultural traditions of Euro-North American humanism.

This suspicion that biotechnology could challenge the cultural authority of western humanism is best captured by the historian Francis Fukuyama in his cautionary book *Our Posthuman Future*. Here Fukuyama revisits his well-known argument that “after the fall of the Berlin Wall in 1989, older, more familiar patterns of [human] behavior reasserted themselves,” leading to a “worldwide convergence on liberal democracy” (2002: 12). According to Fukuyama, this proved the “tenacity of human nature” to reject socialist “utopian political movements that sought to create an earthly heaven by radically rearranging the most basic institutions of society” (2002: 14). Controversially, in the late 1990s, Fukuyama characterized this supposed alignment of liberal democracy, global capitalism, and human nature as “the end of history.” However, in a stunning reversal, Fukuyama now believes “that the most significant threat posed by contemporary biotechnology is the possibility that it will ... move us into a ‘post-human’ stage of history” (2002: 7). Under the heading “Biotechnology and the Recommencement of History,” Fukuyama echoes a sentiment shared by many prognosticators: “we appear to be poised at the cusp of one of the most momentous periods of technological advance in history,” and at least for Fukuyama, this means that “social engineers and utopian planners” might yet utilize biotechnology to upset the hypothetical alignment of capitalist democracy and human nature (2002: 15). Therefore, according to Fukuyama, the biotech century is best understood as a return to historical struggle, which he predicts will take the form of a contest over who or what counts as human.

Expanding on these concerns, E.O. Wilson, the renowned biologist, offers a vision of the biotech future that illustrates many of the common underlying assumptions about human nature and civilizational progress